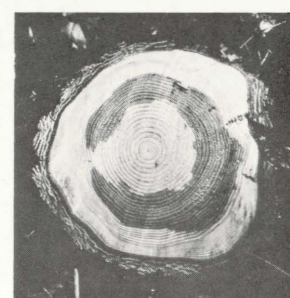


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*"Workshops develop a better dialogue
between researcher and user."*

Workshops On Root Rots In Conifer Stands

PLANNING AND EXECUTION Phase 1/Coastal Stands

G.W. Wallis and D.J. Morrison
Canadian Forestry Service

85008

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Fig. 1. Field stop in precommercial thinning stand. Sign indicates the dominant root rot in the stand.

INTRODUCTION

Damage caused by the three root rot fungi *Armillaria mellea* (Vahl. ex Fr.) Kumm., *Fomes annosus* (Fr.) Karst and *Phellinus (Poria) weirii* (Murr.) Gilbertson is known to be widespread throughout coniferous forests growing in the central and southern regions of coastal and interior British Columbia. With the advent of intensive forest management, the effect of these root rots will be significant to both the Forest Service and the Industry, not only in terms of timber lost but also in significantly limiting management practices.

Although a number of publications have appeared on root rots in B.C., contacts with management and supervisory personnel indicated that a lack of knowledge existed on the consequences of infection in stands and on identification criteria. It was our opinion that this could best be rectified by a series of workshops located in strategic points

throughout the affected region and designed to emphasize recognition characteristics, consequences of infection and management proposals for the three root rot fungi.

Research indicated that silvicultural manipulation of stands to control root rot losses has severe limitations, both from costs and from management complexities. However, a general appreciation of the three root rot diseases will do much to reduce future losses of timber and management spending in stands with a potential for heavy damage. The workshops were designed with these needs in mind.

PLANNING

Preplanning

Prior to a meeting to discuss workshop details, letters were sent to and consultations held

with interested parties in the Forest Service and Industry to gain an appreciation of interest and what schedule, locations and format would best meet the requirements of attendants.

A formal meeting was called, with Mr. Macdonald (Program Manager, Protection) and the authors in attendance, to discuss workshop details. Previous workshops on dwarf mistletoe (1) and mountain pine beetle (8) provided background information in planning the root rot workshops.

Format of the Workshops

Originally we felt that sessions lasting two days would be required to meet the aims of the workshops. However, after discussions with a number of persons in C.F.S., B.C.F.S. and Industry, we concluded that this would be impractical; plans were therefore formulated on a one-day basis. This on hindsight proved to be a wise decision.

From the outset, we decided to limit the opening formal slide presentation to 90 minutes and to spend most of the time in the forest observing damage on a first-hand basis.

The field demonstrations were designed to illustrate losses in the three phases of stand development, mature second-growth, commercial thinning and precommercial thinning or spacing. The first stop would be in the oldest stand so that attendants would be knowledgeable on the potential of Phellinus weirii to cause losses when looking at infection in young stands.

Because the majority of each workshop would be spent in the field examining individual infected root systems and decay characteristics in individual stems, we decided to limit attendance at each session. Recognizing a need for flexibility, our aim was to hold the numbers attending to less than 25.

Formal Slide Presentation

The formal presentation, including opening remarks, was to be limited to approximately 90 minutes, 15 minutes for introduction and 25 minutes for each of the three fungi. The purpose of the presentation was to highlight aspects of impact, development, identification and control so that attendants would have a better appreciation of the diseases



Fig. 2. Fungus and wood decay samples were prominently displayed in the meeting rooms.

when they were confronted with them in field demonstrations. The need to recognize differences among the fungi was stressed because of management implications. Dr. Morrison presented the material on A. mellea and F. annosus and Dr. Wallis handled P. weirii.

Following the first workshops, it was apparent that the attendants were having difficulty keeping the separate features of the three fungi clear in their minds, both during the formal presentation and at the field demonstration sites. Consequently, signs bearing the fungus names were prepared and prominently displayed at all presentations (Fig. 1); this appeared to alleviate some of the problems.

Fungus and wood decay samples were collected to illustrate damage caused by each of the three fungi. These were prominently displayed in the meeting room and utilized to illustrate pertinent points during the oral presentation (Fig. 2).

Sessions were to commence at 8:30 or 9:00 a.m., depending on the distance attendants had to travel.

The groups were to return to the meeting room at the finish of the field tours for a final question period and discussion and a summation of the day's activities.

Mr. Macdonald would open the first workshop, formally welcoming attendants and defining the



Fig. 3. Sections ("windows") were cut into trees to illustrate decay present in the stem although there were no external indicators of infection.

objectives of the undertaking.

One workshop was scheduled to accommodate P.F.R.C. personnel.

Field Demonstrations

The objectives of the field demonstrations varied among the three fungi. Because of the difficulty in recognizing infection symptoms of *F. annosus*, field stops were designed to illustrate some of the more subtle characteristics that can be used to identify infection centers. "Windows", cut into what seemed, by external appearance, to be healthy trees but which had extensive heartrot, were to be used as attention getters (Fig. 3). Good demonstration material for *F. annosus* was the most difficult to find at all field demonstration sites. Stem decay following infection through wounds was featured at each workshop (Figs. 4).

Phellinus weirii was demonstrated in the three phases of stand development, mature second-growth, commercial thinning and precommercial thinning, in that order. Identification features were stressed, particularly in young stands where the need to differentiate between *P. weirii* and *A. mellea* is essential.



Fig. 4. *Fomes annosus* decay in the butt of a western hemlock. Decay had entered through a scar.

PC-13-159
1180-137/8

Pacific Forest Research Centre,
Canadian Forestry Service,
506 West Burnside Road,
Victoria, B.C. V8Z 1M5.

June 30, 1976.

Dear Sir:

The Canadian Forestry Service will present a series of workshops on root rots in young coniferous stands. These initial workshops have been designed for foresters and field supervisors.

Root rots are now recognized as a significant problem governing management alternatives in many young stands. Three fungal species are involved, *Phellinus weirii*, *Fomes annosus* and *Armillaria mellea*; each require specific silvicultural treatments. The purpose of the workshops therefore, are to alert concerned personnel to the diseases, familiarize them with the causal fungi and to discuss management strategies available for treating diseased stands.

The majority of the workshop will be in the field, observing the damage on a first-hand basis. For this reason, we wish to restrict the attendance to approximately 20 people per session. We also feel that discussion will be more varied and profitable if there is a mix of government and company personnel in attendance.

For these reasons, we have indicated the number of people we would like to have attend various sessions from your agency. This may not be entirely realistic so we have attached a form for you to fill out and to indicate choices more suited to your people. An early return of the form would be most appreciated.

Details of the location and schedule of the workshops will be forwarded closer to the date they are to be held.

Yours sincerely,

M. H. Drinkwater,
Director.

Encl. 1

Fig. 5. Letter of invitation to attend workshops.

ROOT ROT WORKSHOPS								
Agency:	Cowichan Lake				Campbell River	Woss Camp	Squamish	
	Aug. 10	Aug. 12	Oct. 5		Oct. 7	Oct. 20	Nov. 3	Nov. 4
No. of persons requested to attend								
This no. is satisfactory (check)								
This no. is not satisfactory, would prefer (no.)								
In addition to the above, we have _____ people interested in attending a workshop.								
June 30/1976								

Fig. 6. Form which accompanied letter of invitation indicating the number of attendants requested at each session.

Armillaria mellea infection was illustrated in precommercial thinning stands. Emphasis was placed on recognizing symptoms that would enable the attendants to distinguish A. mellea from P. weirii, a critical decision in management planning.

Since the workshops were held in the fall, with the possibility of rain, trails were cleared of underbrush into all demonstration sites.

Field presentations were shared between the authors.

Locations and Schedule of Workshops

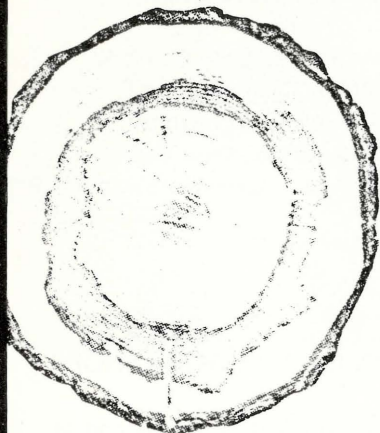
Initially, seven workshops were planned (asterisk); however, requests for persons to attend beyond those originally anticipated required that we hold six additional sessions. Scheduling was as

THE WORKSHOP

"It has to be one of the better methods of communicating with the practising forester", is the way David Wallinger described a recent forestry workshop. Webster describes the workshop where emphasis is

were made aware of the seriousness of the problem, the organizers were asked to hold additional sessions to accommodate forestry crews.

Dr. Wallis said that there was excellent involvement by the particularly field personnel who had a direct



Root rot robbing forest industries

Root rots literally rob British Columbia of millions of dollars annually because of damage to young coniferous trees, claim scientists at the Canadian Forest Research Centre, Vancouver, B.C.

Phellinus weirii infects trees in the seedling and sapling stages, as well as the pole-sized and timber trees. In the latter case, infection centers have exceeded more than an acre in area. Some trees are killed quickly while standing, others may be killed following

Although scientists encourage encouragement in eradicating the disease, they hope to discover a system from further research.

Root rot problems on forests discussed at workshop series

The impact of root rots on young coniferous forests will be the subject of a series of one-day workshops being held by the Canadian Forestry Service on Vancouver Island and the lower mainland.

Designed for foresters, land managers and woods supervisors, the workshops will explain the consequences and life cycles of three root rot fungi and look at identifying them.

Anyone wishing further information should contact Dr. G. W. Wallis at the Pacific Forest Research Centre, Burnside Road, Vancouver, B.C. V8Z 1M5.

Research Centre, Burnside Road, Vancouver, B.C. V8Z 1M5.

ROOT ROT WORKSHOPS

The impact of root rots on young coniferous forests will be the subject of a series of one-day workshops being held by the Canadian Forestry Service on Vancouver Island and the lower mainland.

Designed for foresters, land managers and woods supervisors, the workshops will explain the consequences and life cycles of three root rot fungi and look at identifying them. The workshops will include field demonstrations on stands infected by root rots. Seven workshops will be held on Vancouver Island and the lower mainland.

Fig. 7. Press releases on workshops.

follows:

B.C.F.S. Experiment Station, Cowichan Lake:
August 10*, 12*; September 29, 30, October 5*, 13, 14

Campbell River: October 7*

Woss Camp (Nimpkish Valley): October 20*, 21

Squamish: November 3*, 4*

Port Alberni: November 10

Invitations

Invitations were sent to the Council of Forest Industries and to the Chief Foresters of the Forest Service and the major industrial companies by the Director of the Laboratory. The letter (Fig. 5) outlined the reasons for the workshops and their aim. Because of the need to restrict attendance at the workshops, a form was included with the letter (Fig. 6) indicating the number of people requested to attend at each date. The total approximate numbers expected from each agency had been ascertained from previous discussions and correspondence. Each agency was requested to express agreement or to change the numbers to suit their requirements. An expression of numbers of people wishing to take the workshops beyond those anticipated was also requested at this time.

Reminders of the next meeting time and place were sent throughout the series of workshops.

Handouts and Guest Book

Handouts were assembled in folders bearing the Environment Canada label. Literature included is listed in the references accompanying this report (2,3,4,5,6,7,9,10). A sheet summarizing pertinent characteristics of the three root rot fungi was prepared by Dr. Morrison for inclusion in the handout folder.

A guest book bearing a front-cover color photo of *P. weirii* decay in the cross section of a Douglas-fir stump, was prepared by the Information Service.

Publicity

T. C. Jones, Information Officer, included an announcement of the workshops in Information Forestry (3) and prepared a news release to Vancouver Island papers prior to the first workshops in August

(Fig. 7). An article, accompanied by a colored illustration, prepared by T.C. Jones and A. MacEwan (P.F.R.C. Editor), summarizing root rot problems and the workshops, appeared in the September, 1976, issue of the B.C. Lumberman (Fig. 7).

Meeting Rooms

We are indebted to the B.C. Forest Service, Canadian Forest Products Limited and MacMillan Bloedel Limited for making available to us the under-noted meeting room accommodations:

B.C.F.S. Experiment Station, Cowichan Lake
B.C.F.S., Nursery Office, Campbell River
B.C.F.S., Ranger Headquarters, Squamish
Canadian Forest Products Ltd., Woss Camp
MacMillan Bloedel Ltd., Cameron Division, Port Alberni

EXECUTION OF THE WORKSHOPS

Drs. D. Morrison and G. Wallis and Mr. A. Johnson and Mr. G. Reynolds handled the workshops. They were assisted at all locations by Forest Service and Company personnel in finding suitable field demonstration stands.

Meeting rooms were organized, displays set out, etc., on the afternoon prior to the workshop. Field stops were inspected and signed the day before the workshop.

Coffee was available to the attendants when they arrived in the morning, following the formal presentation, and when they returned to the meeting room after the field presentations.

The fungus and wood decay demonstration material was a valuable adjunct to the slide presentations. (Fig. 2)

Following general remarks on root rot by Dr. Wallis, Dr. Morrison presented his slide talk on *A. mellea* and *F. annosus*, then Dr. Wallis presented his slide talk on *P. weirii*. This portion of the program was adequately completed in 90 minutes, 15 minutes for the opening remarks and 25 minutes for each of the three fungi. Following coffee, the groups left for the field at approximately 10:45 a.m.

The first field stop was in the mature second-



Fig. 8. Dr. Wallis explaining the consequences of *Phellinus weirii* root rot infection in a 75-year-old stand of Douglas-fir.



Fig. 9. *Phellinus weirii* root rot in a 120-year-old stand of Douglas-fir.



Fig. 10. Dr. Morrison explaining the identification features of *Armillaria mellea* root rot in a 20-year-old Douglas-fir.

growth phase of stand development to view *P. weirii* (Fig. 8, 9). This enabled the attendants to visualize the potential losses that can be sustained by rotation age. *Phellinus weirii* was then examined in both a commercial and a precommercial thinning size stand. A detailed comparison of the symptoms of *P. weirii* and *A. mellea* was made at the latter stop (Fig. 10). *Fomes annosus* was illustrated in windthrown trees, in trees with butt rot entering from stumps of the previous stand and in trees infected through wounds (Fig. 11).

The groups returned to the meeting rooms between 3:00 and 4:00 p.m. for a question and discussion period and for a summation of pertinent factors brought out in the day's activities.

No attempt was made to supply transportation for all attendants. Sufficient Forest Service and

Table 1. Total attendance and attendance at each of the workshops from the various agencies.

Agency	Total	August		September		October					November			
		10	12	29	30	5	7	13	14	20	21	3	4	10
B.C.F.S.	61	8	4			6	5		7	2	9	8	12	
B.C.F.P.	25	3	6			5		10	1					
C.F.P.	13									7	6			
Crown Zellerbach	14	3	2			3	4			2				
MacMillan Bloedel	48	4	1	18		1	7			1		3		13
Pacific	7	2	2			3								
Rayonier	7	2					1			2		2		
Tahsis	6									4	1	1		
Weldwood	4						2					1	1	
Others	45	1	2		19	3			5			3	12	
Total	230	23	17	18	19	18	22	10	13	18	16	18	25	13



Fig. 11. Dr. Morrison illustrating the decay caused by *Fomes annosus* in western hemlock. The fungus had entered through the roots.

Company vehicles were present at each workshop to transport attendants.

ATTENDANCE

A total of 230 persons signed the guest book. Twenty six per cent were from the Forest Service, 54% from industrial forest companies and the remaining 20% from universities, colleges, C.F.S., a consulting firm, and U.S.A. and State governments. Attendance is listed in Table 1.

COSTS

A total of 142 man-days, 92 professional and 50 technician, were spent in preparing and executing the 13 workshops by pathology staff members. In addition, Graphics and Photographic Services contributed one man-day and Information Services five man-days

The total moneys spent was \$2352 (Table 2).

Table 2. Dollar expenditures in the preparation and execution of the 13 workshops

Travel	\$1550
Mileage (9400 miles at 6c)	564
Sign painting	133
Printed material	50
Folders for handouts	55

Meeting room accommodations were supplied gratis by the B.C. Forest Service, Canadian Forest Products Ltd. and MacMillan Bloedel Ltd.

SUMMATION

We were satisfied with the response to the workshops as judged on attendance, question periods and subsequent comments (Fig. 7). The request for six workshops in addition to those originally planned confirmed our belief that the sessions were being well received and the information utilized.



Fig. 12. *Phellinus weirii* root rot in a 25-year-old stand of Douglas-fir.

Keeping the opening formal presentation short so that most of the day could be spent in the field proved the best way to present the material. Time spent in finding good field demonstration areas and in preparing them well proved to be very beneficial. Inclusion of "attention getters" such as decay "windows" (Fig. 7) and slices out of standing infected trees proved worthwhile. Examining heavy losses caused by *P. weirii* in mature second-growth first enabled the attendants to better appreciate the potential for losses when they were viewing the disease in young stands where the infection centers were small but frequent.

Eye-catching fungus name signs (Fig. 1) used both at the formal presentation and at all field stops helped reduce the confusion among the characteristics of the three fungi that existed in the minds of those attending the first workshop.

Use of "live" demonstration material in place of pictorial displays in the meeting rooms (Fig. 2) gave the attendants a good grasp of the symptoms

and signs of the three root rot fungi before going into the field.

Although the workshop schedule extended to November 10, we were extremely fortunate that rain fell (lightly for an hour) during only one of the 13 workshops. The fall of 1976 was much drier for longer than average so we would recommend that when planning future workshops, sessions should not extend much beyond the middle of October.

Because of the nature of the field demonstrations, limiting attendance to less than 25 persons per session proved to be a wise decision. Keeping the group together and holding attention when displaying material did not prove to be a problem at any of the workshops.

When attendance is to be limited, an estimate of the number of interested persons from each agency should be solicited early in the planning stage. This is particularly true for the Forest Service because their personnel are so widely distributed.

Most of the Companies preferred to have their people attend workshops on or near their own holdings. Spreading the workshops over five locations, although taking considerable time to organize, proved worthwhile in this regard.

FUTURE RESEARCH RECOMMENDATIONS

Deciduous species were recommended as an alternative for Douglas-fir when planting infection centers. It was pointed out on a number of occasions that very little is known about the silviculture of most of our deciduous species.

Western white pine is a species that could be considered for planting in infection centers. Currently, however, use of this species is severely limited because of killing by white pine blister rust. The discussions indicated that there is a need for a strong, well-coordinated program for developing resistance to rust in white pine.

Concern for losses attributable to root rot was evident throughout the workshops. Because of the severe limitations on silvicultural control measures, any approach which would appear to have reasonable success for control should be given consideration.

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506 West Burnside Road
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BC-P-13 February, 1977

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